

## **CLAIMS**

**1. A  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program, in order to support designing of  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy, which cause the computer to function as:**

**input means for inputting alloy composition, working temperature and working stress of Ni-based superalloy;**

**storage means for preliminarily storing Ni-based superalloy constituent elements, structural factor formula, and alloy characteristics formula;**

**structural factor calculating means for calculating the structural factors from the alloy composition by using the structural factor formula being read out from the storage means;**

**alloy characteristics calculating means for calculating the alloy characteristics from the alloy composition, structural factor, working temperature, and working stress by using the alloy characteristics formula being read out from the storage means; and**

**output means for outputting the structural factor and alloy characteristics together with the alloy composition.**

**2. A  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus, being an apparatus for supporting designing of  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy, comprising:**

**input means for inputting alloy composition, working temperature and working stress of Ni-based superalloy;**

**storage means for preliminarily storing Ni-based superalloy constituent elements, structural factor formula, and alloy characteristics formula;**

**structural factor calculating means for calculating the structural factors from the alloy composition by using the structural factor formula being read out from the storage**

means;

alloy characteristics calculating means for calculating the alloy characteristics from the alloy composition, structural factor, working temperature, and working stress by using the alloy characteristics formula being read out from the storage means; and output means for outputting the structural factor and alloy characteristics together with the alloy composition.

3. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 1 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 2, wherein constituent elements stored in the storage means are Ni, Co, Cr, Mo, W, Al, Ti, Nb, Ta, Hf, Re, Ir, Ru, Rh, Pd, and Pt.

4. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 1 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 2, wherein the structural factor formula stored in the storage means includes at least the equilibrium formula of gamma phase and  $\gamma'$  phase at working temperature.

5. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 4 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 4, wherein the equilibrium formula of  $\gamma$  phase and  $\gamma'$  phase is composed of a formula of  $\gamma'$  surface at working temperature and a formula of partitioning ratio.

6. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 1 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 2, wherein the alloy characteristics formula stored in the storage means is expressed as function of alloy composition, structural factor, working temperature and working stress.

7. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based

**superalloy designing support program of claim 1, wherein the computer is further functioned as  $\gamma'$  phase calculating means for calculating the composition of  $\gamma$  phase and  $\gamma'$  phase at working temperature, and the amount ratio of  $\gamma'$  phase, by simultaneously operating iterative convergent calculation of  $\gamma'$  phase composition and partitioning ratio about constituent elements, and iterative calculation of  $\gamma'$  phase quantity.**

**8. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 2, further comprising  $\gamma'$  phase calculating means for calculating the composition of  $\gamma$  phase and  $\gamma'$  phase at working temperature, and the volume fraction of  $\gamma'$  phase, by simultaneously operating iterative convergent calculation of  $\gamma'$  phase composition and partitioning ratio about constituent elements, and iterative calculation of  $\gamma'$  phase quantity.**

**9. A  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program, in order to support designing of  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy, which cause the computer to function as:**

**input means for inputting one or more required performances, working temperature and working stress of Ni-based superalloy;**

**storage means for preliminarily storing Ni-based superalloy constituent elements, structural factor formula, and alloy characteristics formula;**

**alloy composition calculating means for calculating the alloy composition for satisfying the required performance;**

**structural factor calculating means for calculating the structural factors from the alloy composition by using the structural factor formula being read out from the storage means;**

**alloy characteristics calculating means for calculating the alloy characteristics from the alloy composition, structural factor, working temperature, and working stress by**

using the alloy characteristics formula being read out from the storage means; and output means for outputting the structural factor and alloy characteristics together with the alloy composition.

10. A  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus, being an apparatus for supporting design of  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy, comprising:

input means for inputting one or more required performances, working temperature and working stress of Ni-based superalloy;

storage means for preliminarily storing Ni-based superalloy constituent elements, structural factor formula, and alloy characteristics formula;

alloy composition calculating means for calculating the alloy composition for satisfying the required performance;

structural factor calculating means for calculating the structural factors from the alloy composition by using the structural factor formula being read out from the storage means;

alloy characteristics calculating means for calculating the alloy characteristics from the alloy composition, structural factor, working temperature, and working stress by using the alloy characteristics formula being read out from the storage means; and

output means for outputting the structural factor and alloy characteristics together with the alloy composition.

11. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 9 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 10, wherein constituent elements stored in the storage means are Ni, Co, Cr, Mo, W, Al, Ti, Nb, Ta, Hf, Re, Ir, Ru, Rh, Pd, and Pt.

12. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based

**superalloy designing support program of claim 9 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 10, wherein the structural factor formula stored in the storage means includes at least the equilibrium formula of  $\gamma$  phase and  $\gamma'$  phase at working temperature.**

**13. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 12 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 12, wherein the equilibrium formula of  $\gamma$  phase and  $\gamma'$  phase is composed of a formula of  $\gamma'$  surface at working temperature and a formula of distribution ratio.**

**14. The  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support program of claim 9 or  $\gamma'$  precipitation strengthened platinum group element-added Ni-based superalloy designing support apparatus of claim 10, wherein the required performance is one or more selected from one or both of the alloy characteristics and structural factor.**